Claims:

1. A semiconductor processing apparatus, comprising:

a central substrate transfer enclosure having at least one substrate transfer robot positioned therein;

a substrate activation chamber in communication with the central substrate transfer enclosure and accessible to the at least one substrate transfer robot;

a substrate plating chamber in communication with the central substrate transfer enclosure and accessible to the at least one substrate transfer robot;

a substrate spin rinse dry chamber in communication with the central substrate transfer enclosure and accessible to the at least one substrate transfer robot;

a substrate annealing chamber in communication with the central substrate transfer enclosure and accessible to the at least one substrate transfer robot; and

at least one substrate pod loader in communication with the substrate transfer chamber and accessible to the at least one substrate transfer robot.

2. The semiconductor processing apparatus of claim 1, wherein the at least one substrate transfer robot comprises a first substrate transfer robot and a second substrate transfer robot, wherein the first and second substrate transfer robots have a handoff positioned therebetween.

3. The semiconductor processing apparatus of claim 2, wherein the first substrate transfer robot is configured to access at the least one pod loader, the substrate activation chamber, and the substrate plating chamber, and the second substrate transfer robot is configured to access the at least one pod loader, the substrate spin rinse dry chamber, and the substrate annealing chamber.

4. The semiconductor processing apparatus of claim 2, wherein the first substrate transfer robot is configured to pick up a substrate in the substrate plating chamber and transport the substrate to the handoff position and the second

substrate transfer robot is configured to pick up the substrate from the handoff position and transfer the substrate to the substrate spin rinse dry chamber.

5. The semiconductor processing apparatus of claim 2, wherein the first substrate transfer robot is positioned in a first region of the transfer enclosure and the second substrate transfer robot is positioned in a second region of the transfer enclosure.

6. The semiconductor processing apparatus of claim 5, wherein the first region is in communication with the activation chamber and the plating chamber and the second region is in communication with the spin rinse dry chamber and the annealing chamber.

7. The semiconductor processing apparatus of claim 1, wherein the a substrate activation chamber comprises:

a centrally positioned rotatable substrate support member configured to support a substrate in a face up position; and

a fluid dispensing assembly configured to dispense an activation solution onto a substrate surface.

8. The semiconductor processing apparatus of claim 1, wherein the substrate plating chamber comprises a rotatable substrate support member configured to support a substrate in a face up configuration and a pivotally mounted plating fluid dispensing nozzle positioned above the substrate support member.

9. The semiconductor processing apparatus of claim 1, wherein the substrate plating chamber comprises:

a rotatably mounted substrate support member configured to secure a substrate thereto in a face up configuration;

an evaporation shield having a diameter approximately equal to the substrate support member and a substantially planar lower surface, the evaporation shield being selectively positioned above the substrate support member, the evaporation

shield having a bore formed therein for communicating a processing solution therethrough to the lower surface thereof; and

a fluid dispensing assembly configured to dispense a processing fluid onto a substrate via the bore in the evaporation shield.

10. The semiconductor processing apparatus of claim 9, wherein the lower surface of the evaporation shield is configured to be positioned between about 1 mm and about 5 mm from the substrate support member in a processing position.

11. The semiconductor processing apparatus of claim 9, wherein the evaporation shield is selectively movable between a substrate processing position and a substrate loading position.

12. The semiconductor processing apparatus of claim 9, wherein the evaporation shield is configured to maintain the processing fluid in a processing region defined by a surface of the substrate and the lower surface of the evaporation shield with an outer seal member.

13. The semiconductor processing apparatus of claim 12, wherein the evaporation shield is configured to maintain the processing fluid in the processing region through a meniscal force.

14. The semiconductor processing apparatus of claim 9, wherein the evaporation shield is selectively rotatable.

15. The semiconductor processing apparatus of claim 1, wherein the substrate spin rinse dry chamber comprises a rotatable substrate support member configured to support a substrate thereon and a substrate rinse solution dispensing device positioned above the substrate and configured to dispense a rinsing fluid onto the substrate surface.

16. A semiconductor plating system, comprising:

a central transfer enclosure;

a first substrate transfer robot positioned in a first region of the substrate transfer enclosure;

a second substrate transfer robot positioned in a second region of the substrate transfer enclosure;

at first substrate pod loader in communication with the first region of the substrate transfer enclosure;

a second substrate pod loader in communication with the second region of the substrate transfer enclosure;

an activation enclosure in communication with the first region of the substrate transfer enclosure;

a substrate plating enclosure in communication with the first region of the substrate transfer enclosure;

a substrate spin rinse dry enclosure in communication with the second region of the substrate transfer enclosure;

a substrate annealing enclosure in communication with the second region of the substrate transfer enclosure; and

a substrate handoff positioned in the substrate transfer enclosure and in communication with the first region and the second region.

17. The semiconductor plating system of claim 16, wherein the first substrate transfer robot is configured to access the first pod loader, the substrate activation enclosure, the substrate plating enclosure, and the substrate handoff.

18. The semiconductor plating system of claim 16, wherein the second substrate transfer robot is configured to access the second pod loader, the substrate spin rinse dry enclosure, the substrate annealing enclosure, and the substrate handoff.

19. The semiconductor plating system of claim 16, wherein the activation enclosure comprises:

a rotatably mounted substrate support member configured to support a substrate in a face up position; and

an activation fluid dispensing assembly positioned above the substrate support member and in fluid communication with at least one of an activation fluid source and a rinsing fluid source via at least one selectively actuated flow control valve.

20. The semiconductor plating system of claim 16, wherein the plating enclosure comprises:

a rotatably mounted substrate support member configured to support a substrate in a face up position; and

a plating solution dispensing assembly positioned above the substrate support member and in fluid communication with a plating solution source via a selectively actuated valve.

21. The semiconductor plating system of claim 16, wherein the plating enclosure comprises:

a rotatable substrate support member configured to support a substrate in a face up position;

a rotatably mounted evaporation shield having a substantially planar lower surface and a plating fluid dispensing channel formed therein; and

a plating fluid dispensing assembly configured to dispense a plating fluid into the plating fluid dispensing channel of the evaporation shield.

22. The semiconductor plating system of claim 21, wherein the evaporation shield is configured to be moved between a substrate processing position and a substrate loading position, wherein the processing position includes positioning the substantially planar lower surface proximate an upper surface of the substrate support member.

23. The semiconductor plating system of claim 22, wherein the evaporation shield is configured to be positioned between about 1 mm and about 10 mm from the substrate support member in the processing position.

24. The semiconductor plating system of claim 16, wherein the spin rinse dry enclosure comprises:

a rotatably mounted substrate support member configured to support a substrate in a face up position thereon, the substrate support member being configured to rotate between about 30 rpm and about 10,000 rpm; and

a rinsing fluid dispensing nozzle positioned above the substrate support member.

25. A method for plating a metal on a substrate, comprising:

retrieving a substrate from a first pod loader position with a first substrate transfer robot positioned in a substrate transfer enclosure;

transferring the substrate to an activation chamber in communication with the substrate transfer enclosure for an activation process with the first substrate transfer robot;

removing the substrate from the activation chamber with the first substrate transfer robot and transferring the substrate to a plating enclosure in communication with the substrate transfer enclosure for a plating process;

removing the substrate from the plating enclosure with the first substrate transfer robot and positioning the substrate on a handoff position in the substrate transfer enclosure;

retrieving the substrate from the handoff position with a second substrate transfer robot positioned in the substrate transfer enclosure and transferring the substrate to a spin rinse dry enclosure in communication with the substrate transfer enclosure for a rinse and dry process;

removing the substrate from the spin rinse dry enclosure with the second robot and transferring the substrate to an annealing chamber in communication with the substrate transfer enclosure for an annealing process; and

transferring the substrate to a second pod loader in communication with the substrate transfer enclosure with the second substrate transfer robot.

26. The method of claim 25, wherein the activation process comprises rotating the substrate on a rotatably mounted substrate support member while dispensing an activation fluid onto the substrate surface.

27. The method of claim 25, wherein the plating process comprises rotating the substrate on a rotatably mounted substrate support member while dispensing a plating solution onto the substrate surface.

28. The method of claim 25, where the plating process comprises:

positioning an evaporation shield in a loading position;

positioning the substrate on a substrate support member;

positioning the evaporation shield in a processing position, wherein the processing position is configured to position a lower planar surface of the evaporation shield between about 1 mm and about 10 mm from the substrate;

dispensing a plating solution into a processing region defined by the substrate and the evaporation shield;

agitating the plating solution in the processing region by rotating at least one of the evaporation shield and the substrate support member; and

removing the substrate from the plating enclosure by positioning the evaporation shield in the loading position and retrieving the substrate with the first substrate transfer robot.

29. The method of claim 25, where the rinse and dry process comprises rotating the substrate on a rotatable substrate support member at a first rotation rate while dispensing a rinsing solution onto the substrate, terminating the dispensing of the rinsing fluid, and rotating the substrate at a second rotation rate to spin dry the substrate, wherein the first rotation rate is less than the second rotation rate.

30. The method of claim 25, wherein the first substrate transfer robot is positioned in a first region of the substrate transfer chamber and is configured access the first pod loader, the activation enclosure, the plating enclosure, and the handoff position.

31. The method of claim 25, wherein the second substrate transfer robot is positioned in a second region of the substrate transfer chamber and is configured access the second pod loader, the annealing enclosure, spin rinse dry enclosure, and the handoff position.